MODEL STATE GUIDANCE DOCUMENT GOVERNING AVIAN AND BAT IMPACTS FROM WIND FACILITIES

Prepared by Clean Energy States Alliance[1]

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The following "model" guidelines are recommendations by the Clean Energy States Alliance (CESA) for consideration for use by state and federal agencies to avoid or minimize impacts to avian and bat species from the construction and operation of wind-energy facilities. The purpose of the proposed guidelines is to outline the types and extent of the information needed to adequately identify, assess, mitigate, and monitor potential adverse effects of wind energy projects on birds and bats.

The approach recommended acknowledges the uncertainty in predicting and understanding effects of wind turbines on birds and bats, including the difficulties in assessing and monitoring bird-turbine potential effects. As the knowledge gaps are filled, and experience in the U.S. grows, these model guidelines will be revised to reflect the improved understanding.

Background

We believe that achieving consistency and standardization among states in their approach and protocols to resolving wildlife risk posed by wind projects has great merit for the following reasons:

- To promote responsible permitting and development of wind facilities across the country;
- To enable states to share information and data regarding avian and bat studies, mitigation and siting practices, and monitoring of habitat/species impacts to increase understanding of risks and the effectiveness of siting decision-making;
- To enable states to share in directing and implementing major research priorities to fill major gaps in our understanding of wildlife impacts from wind facilities;
- To develop effective, consistent, cost-effective methods and protocols to guide project-specific studies to improve assessment of risk and impacts by producing comparable data; and
- To allow for comparison among field studies from around the country.

[1] The Clean Energy States Alliance, or CESA, is a national nonprofit organization that includes public clean energy funds and state agencies from sixteen states. These organizations have joined together in a coalition to promote responsible clean energy development in their states, and collectively, across the country. CESA is managed by the Clean Energy Group.

CESA MODEL GUIDELINES

1. General Approach.

These guidelines are intended to be used in consultation with state wildlife biologists. They should not be regarded as exhaustive or restrictive, but should serve as a starting point for consultation with appropriate state agencies. The approach recognizes that site-specific concerns, such as local patterns of bird or bat use and differences in habitat, may warrant greater or more focused sampling efforts on a case-by-case basis.

2. Early Consultation.

It is recommended that the project applicant consult with the state wildlife agency and the state natural heritage program well in advance of filing applications with the local and/or state agencies responsible for approving wind facility proposals.

3. Pre-Permitting Surveys & Baseline Information.

The site-specific elements of a study plan and the study's duration, frequency, and intensity should be determined in consultation with the state wildlife agency and should depend upon the objectives of the study, the size of the project, availability and extent of existing and applicable information in the vicinity of the project, the habitats potentially affected, the likelihood of the occurrence of sensitive-status species, and the particular location and risk factors at the site.

There are multiple reasons and objectives for conducting pre-permitting studies. For example, a lesser level of effort should be recommended when comparing multiple sites for potential development (i.e., macro-siting) versus the greater level of effort warranted to determine how best to develop a selected site (micro-siting). If a developer is evaluating multiple sites, quantitative baseline studies at each site are ***not*** warranted. For micro-siting, however, baseline studies should be conducted to determine how the site is being used by avian species and whether it is characterized by areas of high concentration of avian species.

The following are recommended protocols for designing and conducting pre-permitting assessment studies. Adequate pre-assessment monitoring typically can be completed *in one year* for micro-siting, except in areas with particularly high uncertainty about the level of impacts and/or high site sensitivity.

a) Gathering Preliminary Baseline Information:

- Existing information on species of interest and their habitats in the vicinity of the project area should be reviewed and spatial information should be mapped. Sources

of existing information should include information compiled by resource agencies and recognized databases.

- Information on vegetation and land cover types, habitat for the species of interest, and physical characteristics of the project area should be collected.

- An assessment of potential bird and bat habitat should be performed at each site being considered for development. The project proponent should conduct several site visits to characterize existing habitats and obtain information regarding observed and likely use by birds and bats. Depending upon the types and extent of use, site visits should be timed to coincide with specific seasons, such as breeding, post-breeding/staging, fall migration, winter, and spring migration. Site visits should be conducted by professional biologists qualified to record all identified avian/bat species observed on the site, their numbers and behaviors, as well as species likely to occur based on existing habitats and known ranges. Standardized approaches, such as transect spot mapping, are generally preferred over non-standardized approaches, depending upon site conditions and accessibility.

- Once a public review process is commenced (e.g., permit application, publicly funded studies), the results from all studies, including raw survey data, should be considered public information and shared with the relevant state and local agencies.

- Field work should include a means of estimating uncertainty (e.g., detection probabilities).

b) Avian Use Surveys

- The survey methods recommended should vary depending on the objectives of the study, the species of interest, and the landscape. In general, the relative abundance of diurnal avian species is best determined by some form of probability sampling. For example, in heavy cover, point counts are the most useful and cost effective approach for developing baseline data on use. In grasslands and shrub-steppe where passerines are the primary target, belt transects may be most appropriate technique for estimating species occurrence and relative abundance. Sampling should be distributed randomly or systematically throughout the area of interest, carried out by experienced observers, and performed at the appropriate time of day in appropriate weather conditions, based on published methodology and as determined in consultation with the state wildlife agency.

- At sites where the objective is to predict impacts or to design the facility to avoid impacts to a specific avian species or group of species and there is significant uncertainty about the likelihood of impacts, a minimum of one full season of avian use surveys is recommended following current state-of-the-art protocols to estimate

the use of the project area by avian species during the season(s) of most concern. Studies should be conducted as seasonally and spatially appropriate, with the intensity and frequency of monitoring to be determined in consultation with the state wildlife agency.

c) Raptor Nest Surveys

- A raptor nest survey should be conducted during the breeding season within 1-mile of the project site (unless a 1-mile scope of survey is impractical because of tree cover, private property access issues, etc.) to determine the location and species of active nests with the highest likelihood of impacts from siting and operation of the wind farm. A larger survey area or more than one survey may be recommended, based on the species of interest and if there is likelihood of the presence of threatened or endangered raptor species. The extent and duration of the raptor nest survey should be determined through consultation with the state wildlife agency.

d) Special Considerations -- Determining the Need for More or Less Pre-Construction Information:

- ***Areas of High Concern and High Site Sensitivity.*** Additional monitoring may be recommended by the state wildlife agency for good cause in areas of high levels of concern, including in the following circumstances:

  1. Rare, threatened or endangered species are identified within or near the project area.

  2. The site is adjacent to an area recognized as nationally or regionally important to birds or bats, such as a national wildlife area or similar area specifically designated to protect birds.

  3. The site is a known area of concentration during migration.

- ***Areas of Low Concern.*** An initial phase 1 avian risk (site) assessment (See NWCC *Studying Wind Energy/Bird Interactions: A Guidance Document*) may be sufficient to determine if impacts to species of concern are likely. This may be adequate if there are recent studies available from projects (including studies of existing wind facilities) in comparable habitat types in locations close to the proposed project and the likelihood of impacts to species of concern is low.

e) Pre-Permitting Assessment of Migratory Birds

- In areas that contain land features and plant communities that may be important for migrants and are likely to concentrate birds, or provide staging, stopover,

concentrated breeding, or wintering areas, a detailed survey of migratory bird passage or bird use is recommended.

- *Quantitative* monitoring should be recommended normally *only* if there is a particular reason to believe migration or use will be concentrated at the site. Quantification of nocturnal migration is very difficult and can only be approximated with radar. However, an index of migration activity can often be obtained by diurnal counts of a nocturnal migrating species during their daily stop-over.

- Radar should *not* generally be required for monitoring unless there are high risk factors involved, such as a suspected migration concentration area for species of concern. Radar is relatively expensive and has a number of limitations including: it is not yet possible to recommend one system over another; radar does not allow identification of species; and radar can not reliably distinguish birds from bats. When recommended, the cost of radar studies should be shared with public funding sources, if possible.

- For landscapes and plant communities that may be important for migrants, passage migration counts are recommended to determine the number of birds flying through or over an area. Observational studies should be used for diurnal migrants (e.g., raptors).

- At present, standards have not been developed for effective acoustic monitoring of migrating birds. This technique is most likely to be used effectively only in the context of a research project.

4. Post-Construction Operations Monitoring

- At sites that support high densities of native breeding birds, concentrations of migrating birds, or threatened or endangered species, as determined by the pre-construction assessment, follow-up monitoring should be recommended, using the same techniques as those used during the pre-construction assessment.

- If baseline data indicates a low level of native bird diversity and numbers and/or data from other sites supports the conclusion that the risk of significant effects is very low, follow-up monitoring studies may not be warranted.

- The purpose of "fatality" studies can include one or more of the following. The purpose of the fatality study determines the sampling size and intensity:

    1. Determine the approximate annual number of collision fatalities of birds and bats on a per turbine/MW basis;

2. Estimate the influence of physical and biological factors such as weather, topography, and habitat on fatality levels; and
3. Evaluate risk predictions from pre-construction studies.

- The purpose of "avian use" studies should be to determine whether bird species composition and relative abundance appear to be influenced by turbines while nesting, foraging, or migrating.

- "Fatality" and "use" studies also should be used to evaluate cumulative effects.

- A technical advisory committee should be established to review monitoring results and make suggestions to the permitting agency regarding the need to adjust mitigation and monitoring requirements.

- When the risk of fatalities is of concern or considered likely for species of concern, mortality surveys should be recommended for one or two years at a fairly modest level of sampling and intensity to determine possible effects. A second year of monitoring may be necessary with an increased sample size if the first year's results indicate concern. The survey methods and techniques should be developed from published or otherwise tested methods and in consultation with the state wildlife agency to establish a sampling design that will result in data collection with sufficient quality and rigor to meet the objectives of the study. If the results are determined significant by a technical advisory group, additional surveys may be requested to consider longer term effects.

- Carcass loss/scavenging trials should be conducted to estimate the length of time that carcasses typically remain in the study area before they are lost due to scavenging or other causes. Carcass trials should cover the period of interest. For example, if passerine fatalities during migration are of greatest interest, then carcass trials should be conducted during spring and fall migration periods. Carcass trials should be designed to yield an estimate of carcass removal rates that can be used to adjust fatality estimates, and should be conducted by trained personnel. Carcass trials should be conducted in conjunction with each search period (e.g., fall, spring) in each year, to account for varying site conditions by season and from one year to the next.

- Searcher efficiency trials should be conducted to yield a correction factor that can be applied to observed fatality numbers, to account for the ability of searches to detect bird and bat carcasses.

- If sampling is required, a probabilistic sampling design should be used (e.g., random, stratified random, systematic with a random start).

- Monitoring may be recommended beyond two years if dictated by the study objectives and if the initial years' results identify significant mortality concerns. For example, if substantial mortality is observed and mitigation measures are implemented, additional surveys may be necessary to verify the effectiveness of the mitigation measures.

- Post construction survey and monitoring results should be made publicly available and submitted to the state wildlife agency as a condition of local and state approvals.

5. Assessing Potential Effects to Bats

- A developer should consider the potential impact of proposed sites on bat populations. In forested areas, forest edges and ridge tops may be of concern for bats. Bats also tend to be detected in higher concentrations around bodies of water and in well-vegetated areas. Specifically, in sites with these features, a site assessment should be performed for bats, including a data search to determine if hibernacula exist nearby and a habitat inventory to determine if there are likely areas of concentration.

- Each of the existing sampling techniques and methodologies (acoustic detection, radar tracking, and mist-netting) have significant limitations in effectively determining bat activity and likelihood of impact. More research is needed to establish reliable sampling techniques for assessing abundance, activity patterns, migration behavior, and whether pre-construction indices of bat activity can predict relative risk at a specific site.

- If a sampling option is recommended for bat activity, the use of acoustic detection with *AnaBat*, or an equivalent, is probably most effective. Because bats generally echolocate as they fly, microphones sensitive to the frequency of sounds that bats use can provide a measure of bat activity to determine if there are a relatively large number of bats in an area. The current recommended methodology is one season (late summer-early fall) with bat echolocation calls recorded with acoustic detectors mounted on pre-existing meteorological towers at varying heights, with an attempt made to mount detectors within the proposed rotor swept area. This data then should be compared with information from a post-construction monitoring survey.

- A developer should conduct post-construction fatality searching for bats based on consultation with the state wildlife agency. Post-construction monitoring for bat mortality should use state-of-the-art search survey protocols and be recommended for the duration of one to two years. Initial post-construction bat mortality surveys can be done at a modest level of intensity (e.g., weekly or biweekly at a sample of turbines during the migration period) to determine a general level of bat mortality. However, if the monitoring indicates larger than expected bat fatalities, additional

monitoring may be recommended by the state wildlife agency, and may involve more frequent sampling to correlate mortality with weather and other factors.

- More detailed bat studies should be required only if it is determined through monitoring at wind sites that wind projects are causing a significant impact on state or regional bat populations.

6. Mitigation

Mitigation measures can occur in three general stages. The first stage involves design of the project, where mitigation should focus on reducing the potential effect of a site before the facility is constructed (which can include rejection of a site because of likely negative, significant consequences to birds or bats). The second stage is construction where careful planning avoids destroying important habitat and reduces disturbance by conducting construction at appropriate times of year and away from sensitive habitat areas. The third stage is operation, where unforeseen problems, such as higher-than-expected avian or bat collisions may occur and should be addressed.

Mitigation to avoid or reduce potential adverse effects should be considered early in the planning process. Standard mitigation measures that should be considered include the following best management practices for facility design and operation, reflected in the applicant's plan of development**:**

- Raptor and bird use of the proposed project area should be evaluated. The extent and amount of baseline data required should be determined on a project-specific basis in consultation with the state wildlife agency.

- The developer should avoid locations identified to have the potential for high risk to birds or bats or occupied by species of particular concern.

- The developer should site a wind power project on disturbed lands where possible.

- The developer should avoid using or degrading high value habitat areas.

- The developer should avoid high bird concentration areas through micro-siting alternatives.

- Use of tubular towers (as opposed to lattice towers) or best available technology is recommended to reduce ability of birds to perch and risk of collision.

- The minimum amount of pilot warnings and obstruction avoidance lighting recommended by the FAA should be used. There should be no permanently installed high intensity lighting. Site lighting generally should be "off" unless needed for specific tasks.

- Road cuts and the number of access roads should be minimized.

- Prior to construction, constraint mapping should be undertaken to assess where roads should or should not be located. Habitat destruction and fragmentation and disturbance of breeding, staging, and wintering birds should be minimized to the extent possible.

- Turbine configuration should avoid creating barriers to bird movement to the extent possible.

- All power lines in open or high elevation, exposed locations should be buried where possible. Overhead lines may be acceptable if they follow tree lines or are otherwise screened from collision risk.

- A decommissioning condition should be established for wind projects that require creation of a plan and fund for removal of the turbines and infrastructure when it ceases operation, and restoration of the site to approximate pre-project conditions.

- Where warranted, a project-specific habitat conservation or restoration plan may be developed that avoids or minimizes negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species.

7. Adaptive Management

Most wind farms will cause some bird mortality. Developers should implement a follow-up program to determine the actual direct impact on birds. As part of the follow-up program, unanticipated impacts should be identified through review of publicly-available monitoring data, and additional monitoring should be recommended if needed. Creation of a balanced technical advisory committee could be useful in making these data evaluations.

If a wind farm is found to cause an unacceptable, unanticipated number of kills, and various mitigation methods identified in Section 6 above prove unsuccessful, other options such as purchase of conservation easements with similar habitat and in same region, should be considered.